



# CERTIFICATION TEST REPORT

## CFR 47 Part 15 Subpart B

Test Report File No.	14-IST-0284	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Alternate
Date of Receipt	April 07, 2014	Begin of test date	May 07, 2014
Date of Issue	May 19, 2014	End of test date	May 13, 2014

Kind of Product	Portable Music Player
Basic Model(s)	PPM21
FCCID	QDMPPM21

Applicant	IRIVER LIMITED.
Address	Iriverhouse, 5, Bangbae-ro 18-gil, Seocho-gu, Seoul, Korea
Manufacturer	IRIVER LIMITED.
Address	Iriverhouse, 5, Bangbae-ro 18-gil, Seocho-gu, Seoul, Korea

Standard	Section 15.107, Section 15.109 [Class B Equipment]
----------	--

**Test Result**

Positive

Negative

Tested By

B.O. KO.

Reviewed By

S.J. CHO

### Comment(s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart B - Unintentional Radiators, Class B.
- The test report with appendix consists of 31 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4





## TABLE OF CONTENTS

<b>Table of contents</b>	2
<b>Information of test laboratory, Measurement Uncertainty,</b>	3
<b>Product information</b>	4
<b>Descriptions of test</b>	5~6
Conducted Emission	5
Radiated Emission	6
<b>Equipment Under Test</b>	7~8
<b>Summary</b>	9
<b>Sample Calculation</b>	10

### ■ Test Conditions and Data - Emissions

◆ Conducted Emissions	0.15 MHz - 30 MHz	Applicable
Test Conditions / Data and Plots		11~15
◆ Radiated Emissions(Limits Below 1 GHz)	30 MHz - 1 GHz	Applicable
Test Conditions / Data and plots		16~18
◆ Radiated Emissions(Limits Above 1 GHz)	Above 1GHz	Applicable
Test Conditions / Data and plots		19~26
◆ The Photos of Test Setup		27~31



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

## INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd.

52-20, Sinjeong-ro 41beon-gil, Giheung-gu,  
Gyeonggi-do, Korea.

TEL : +82 31 326 6700 FAX : +82 31 326 6797

KOLAS Testing No. : KT118  
RRA & FCC(DoC) Designation No. : KR0018  
FCC Registration No. : 400603  
VCCI Member No. : 1739



## Measurement Uncertainty

Conducted Emissions	$U = 2.98$ [dB] (Confidence level approximately 95 %, $k = 2$ )
Radiated Emissions (Antenna - Horizontal)	$U = 3.83$ [dB] (Confidence level approximately 95 %, $k = 2$ )
Radiated Emissions (Antenna - Vertical)	$U = 4.50$ [dB] (Confidence level approximately 95 %, $k = 2$ )



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

## PRODUCT INFORMATION

Body Color	STONE SILVER
Body Material	Aluminum
Display	3.31inch WVGA(480X800) AMOLED Touch Screen
Supported Audio Formats	WAV, FLAC, WMA, MP3, OGG, APE(Normal High Fast), AAC, ALAC, AIFF, DFF, DSF
Sample Rate	FLAC, WAV, ALAC, AIFF : 8kHz~192kHz(8/16/24bits per Sample) DSD Native : DSD64(1bit 2.8MHz), Stereo/ DSD128(1bit 5.6MHz), Stereo
Output Level	Unbalance 2.1Vrms/ Balance 2.3Vrms(Condition No Load)
DAC	Cirrus Logic CS4398 X 2(Dual DAC)
Decoding	Support up to 24bit/ 192kHz Bit to Bit Decoding
Input	USB Micro-B input(for charging & data transfer(PC&MAC)/ Connection Mode : MTP(Media Device)
Outputs	PHONES(3.5mm)/ Optical Out(3.5mm)/ Balanced Out(2.5mm, only 4-pole supported)
Wi-Fi	802.11 b/g/n(2.4GHz)
Bluetooth	V4.0
Dimensions	2.59" (66mm)[W] X 4.21" (107mm)[H] X 0.68" (17.5mm)[D]
Weight	6.5 oz(185g)
Feature Enhancements	Firmware upgrade supported(OTA)
Audio Specification	
Frequency Response	±0.023dB(Condition:20Hz~20kHz)Unbalance & Balance/±0.3dB(Condition:10Hz~70kHz)Unbalance & Balance
S/N	116dB @ 1kHz, Unbalance/ 117dB @ 1kHz, Balance
Crosstalk	130dB @ 1kHz, Unbalance/ 135dB @ 1kHz, Balance
THD+N	0.0007% @ 1kHz, Unbalance/ 0.0005% @ 1kHz, Balance
IMD SMPTE	0.0004% 800Hz 10kHz(4:1) Unbalance/ 0.0003% 800Hz 10kHz(4:1) Balance
Output impedance	1 ohm
Clock Jitter	50ps(Typ)
Memory	Built-in Memory : 128 GB[NAND] External Memory : microSD(Max, 128GB) X 1
Battery	Capacity : 3.250 mAh 3.7V Li-Polymer Battery
Supported OS	Supported OS : Window XP, Window 7,8(32/64bit) MAC OS X 10.7

- EMC suppression device is not used during the test.
- Please refer to user's manual.



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

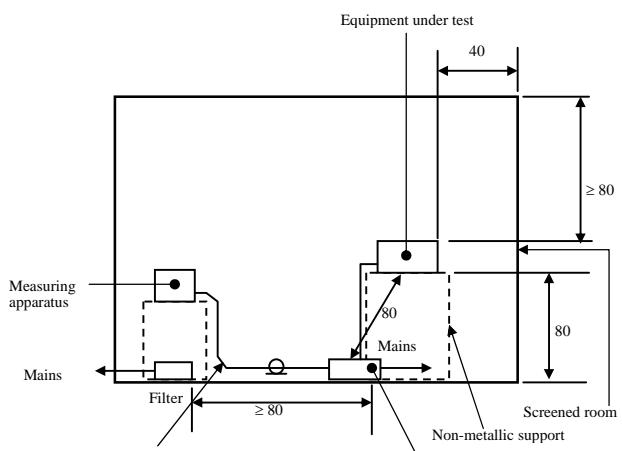
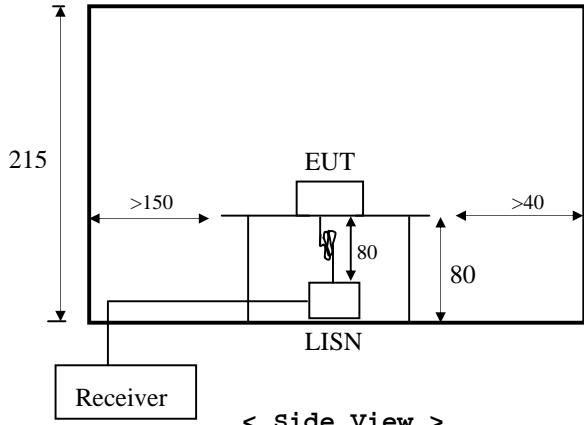
## DESCRIPTIONS OF TEST

### Conducted Emissions:

The measurement were performed over the frequency range of 0.15 MHz to 30 MHz using a  $50 \Omega/50\mu\text{H}$  LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" within a bandwidth of 9 KHz.

#### - Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1 m X 1.5 m wooden table 80 cm height is placed 40 cm away from the vertical wall and 1.5 m away from the other wall of the shielded room. The R/S ESH3-Z5 and Hyup-Rip KNW-407 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80 cm from the LISN and powered from the Hyup-Rip LISN. The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner  $\phi$  1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Hyup-Rip LISN. All interconnected cables more than 1 m were shortened by non-inductive bundling to a 1 m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.15 to 30 MHz. The bandwidth of the receiver was set to 10 kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.





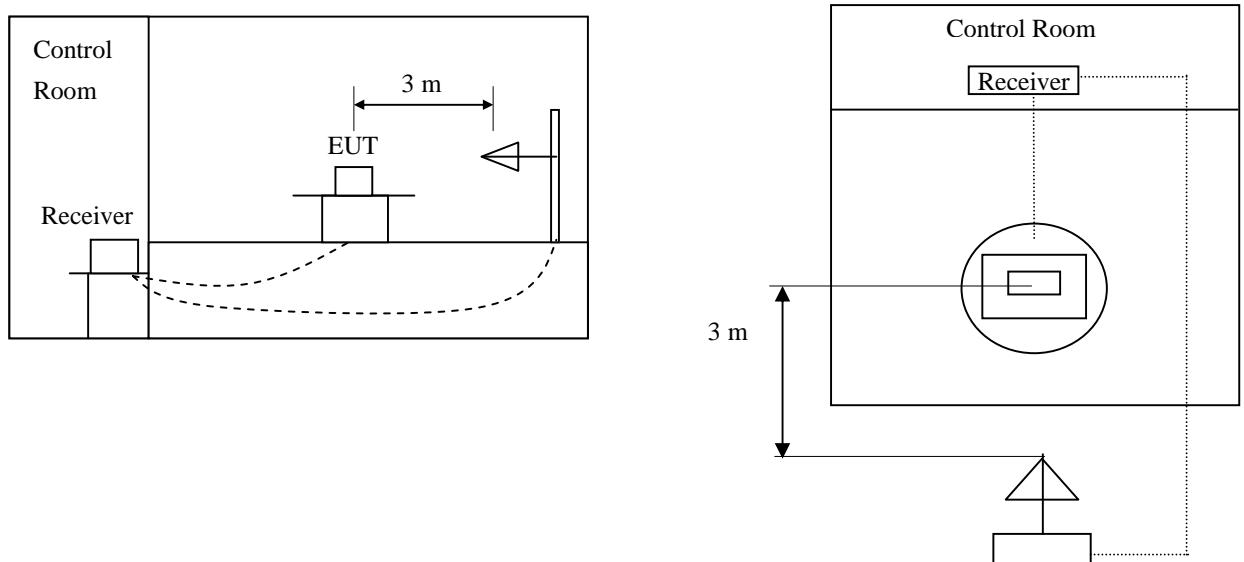
## DESCRIPTION OF TEST

### Radiated Emissions:

The measurement was performed over the frequency range of 30 MHz to 1 GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120 KHz.

#### - Procedure of Test

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 MHz to 1000 MHz using S/B bi-log antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using S/B bi-log antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.





IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

## Equipment Under Test

### EUT Type :

- Table-Top.
- Floor-Standing.
- Table-Top and Floor-Standing(Combination).

### Operation - mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

- Standby Mode
- Operational Condition :
  - Charging + File Up&Down + Play(3.5 π / 2.5 π)
  - Only Play mode(3.5 π / 2.5 π)

### Configuration of the equipment under test :

Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.
PPM21	PPM21	IRIVER LIMITED.	N/A
Laptop	LGR51	LG Electronics	902QTEQ035540
Adapter(Laptop)	PA-1900-08	LG Electronics	N/A
Micro SD	N/A	SanDisk	N/A
EarPhone(3.5 π)	N/A	IRIVER LIMITED.	N/A
Earphone(2.5 π)	N/A	N/A	N/A

### Connecting Interface Cables :

AC Power Cable : 1.8 m (Unshielded)

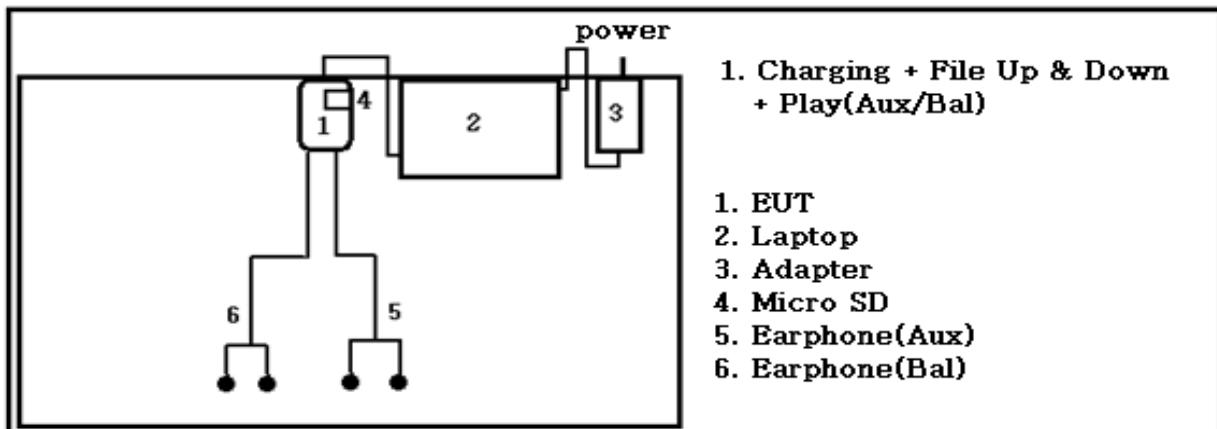
USB Cable(Micro 5pin to USB) : 1.0 m (shielded)

Note : EUT has two Aux port 3.5 π and 2.5 π.

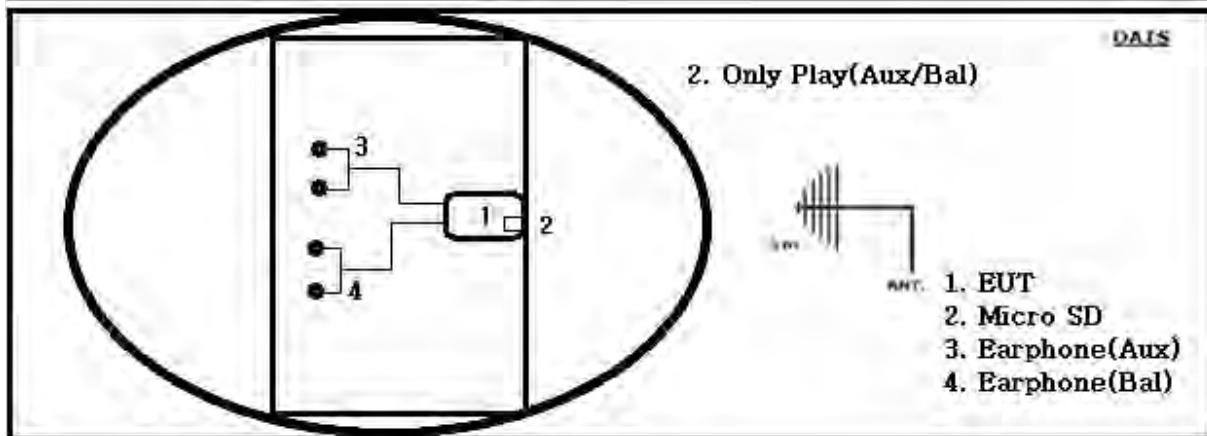
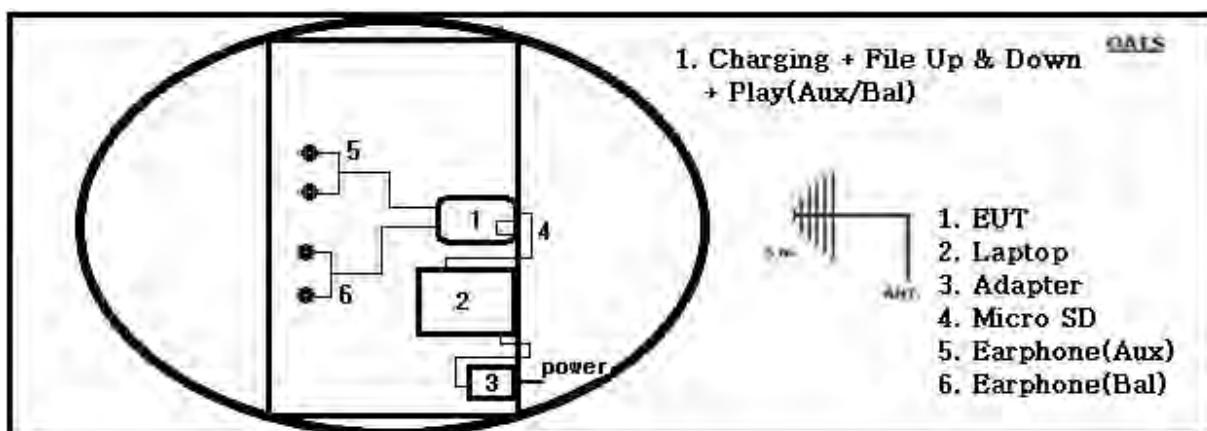
3.5 π Aux port is marked "Aux" and 2.5 π Aux port is marked "Bal" in this report.  
(please refer manual. 2.5 π Aux port is written "Balanced port" in manual.)



## Test Set-Up



Conducted Emissions



Radiated Emissions



## SUMMARY

### Emissions

#### ■ Conducted Emission

The requirements are

- MET
- Not MET

Minimum limit margin

8.25 dB at 0.502 MHz

Maximum limit exceeding

**Remarks : Limits are kept with more than 3 dB margin.**

#### ■ Radiated Emission

The requirements are

- MET
- Not MET

Minimum limit margin

4.82 dB at 892.317 MHz

Maximum limit exceeding

**Remarks : Limits are kept with more than 3 dB margin.**



IST Co., Ltd.

TEST REPORT NO.: 14-IST-0284

## Sample Calculation

### Conducted Emission

#### Sample Signal Strength Calculation

$S(\text{Result}) = \text{Measurement} + \text{IL} + \text{CL}$

Margin = Limit -  $S(\text{Result})$

$S(\text{Result}) = \text{Signal Strength}$

Measurement = Voltage at the Receiver

IL = LISN Insertion Loss

CL = Cable Loss

For example at 15.402 MHz if the measured voltage is 45.35 dBuV, the Cable loss is 0.15 dB, the insertion loss is 0.74 dB, the signal strength would be calculated:

$S(\text{Result}) = 45.35 + 0.15 + 0.74 = 46.24 \text{ dBuV}$

Margin = 60 dBuV - 46.24 dBuV = 13.76 dB

### Radiated Emission

#### Sample Field Strength Calculation

$FS(\text{Result}) = \text{Reading} + \text{AF} + \text{CL}$

Margin = Limit -  $FS(\text{Result})$

$FS(\text{Result}) = \text{Field Strength}$

Reading = Measured Voltage at the Receiver

AF = Antenna Factor

CL = Cable Loss

For example at 240.000 MHz if the measured voltage is 21.70 dBuV with an antenna Distance of 3 meters, the field intensity would be calculated:

$\text{Limit}[\text{dBuV/m}] = 200[\text{uV/m}] = 20 \log(200) = 46.00 \text{ dBuV/m}$

$FS(\text{Result}) = 21.70 + 10.71 + 2.28 = 34.69 \text{ dBuV/m}$

Margin = 46.00 dBuV/m - 34.69 dBuV/m = 11.31 dB



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

## TEST CONDITIONS AND DATA

### Conducted Emissions

[Applicable]

◆ Test Equipment Used

Model	Name	Description	Manufacturer	Due for Cal	Serial No.
ESCI		Test Receiver	Rohde & Schwarz	Jul. 16, 2014	100373
ENV216		LISN	Rohde & Schwarz	Dec. 09, 2014	101718

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Environmental Conditions

Temperature (20.4 ± 0.2) °C

Humidity (43.8 ± 0.2) % R.H.

Atmosphere pressure 1000 mbar

◆ Test Program See the operation mode on page 8

◆ Test Area Conducted Room #1

◆ Test Date May 08, 2014

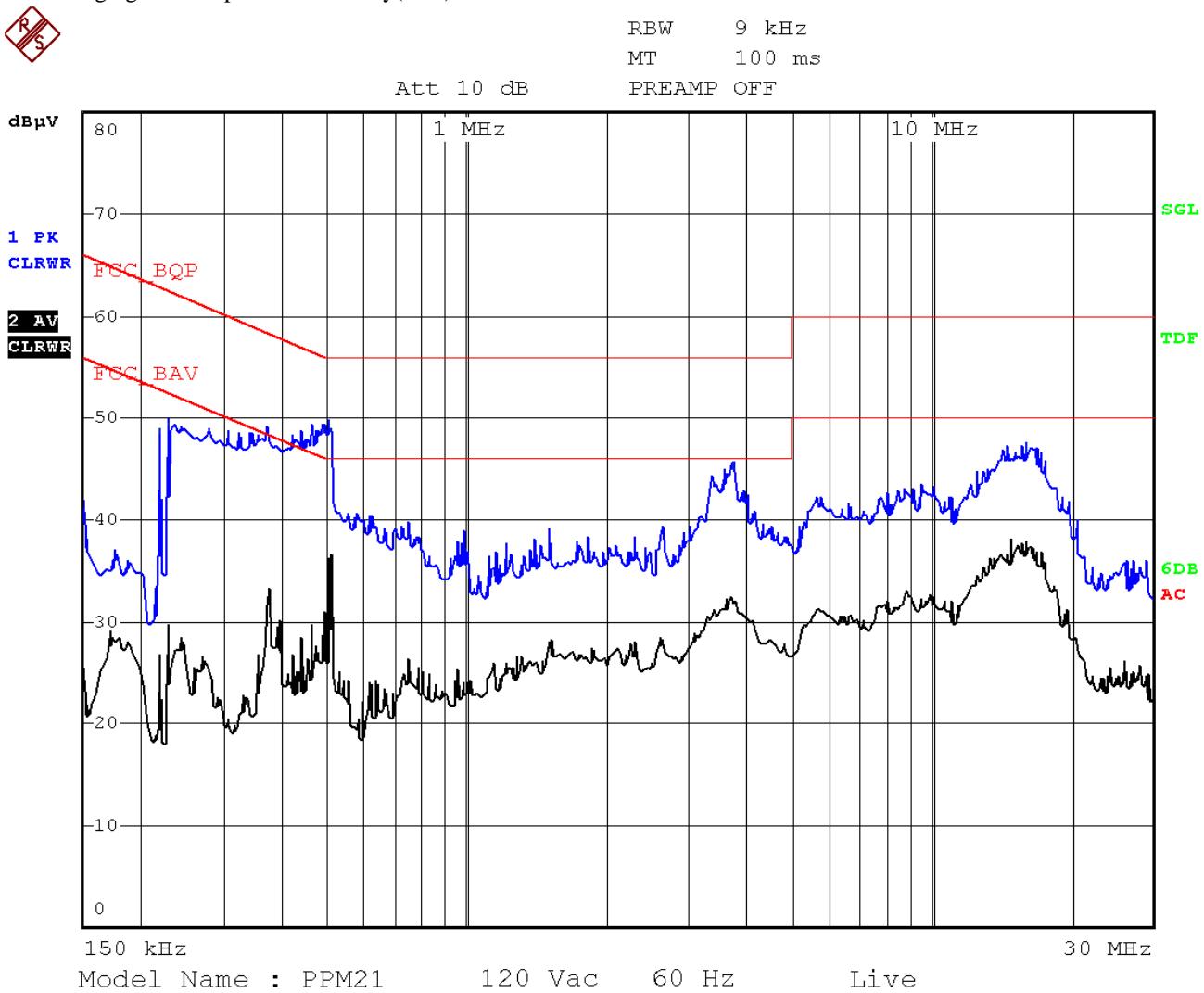
Note :



Conducted Emissions

1. Charging + File Up & Down + Play(Aux)

Live



Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.150	27.82	17.36	66.00	56.00	9.55	0.05	37.42	26.96	28.58	29.04
0.218	38.35	23.28	62.89	52.89	9.55	0.03	47.93	32.86	14.96	20.03
0.226	37.72	21.05	62.60	52.60	9.55	0.03	47.30	30.63	15.29	21.96
0.502	38.15	25.63	56.00	46.00	9.56	0.04	47.75	35.23	8.25	10.77
3.766	29.63	22.71	56.00	46.00	9.58	0.14	39.35	32.43	16.65	13.57
16.118	31.86	26.52	60.00	50.00	9.68	0.25	41.78	36.44	18.22	13.56

**Note** : Charging + File Up & Down + Play(Aux) mode.



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

Conducted Emissions

1. Charging + File Up &amp; Down + Play(Aux) mode

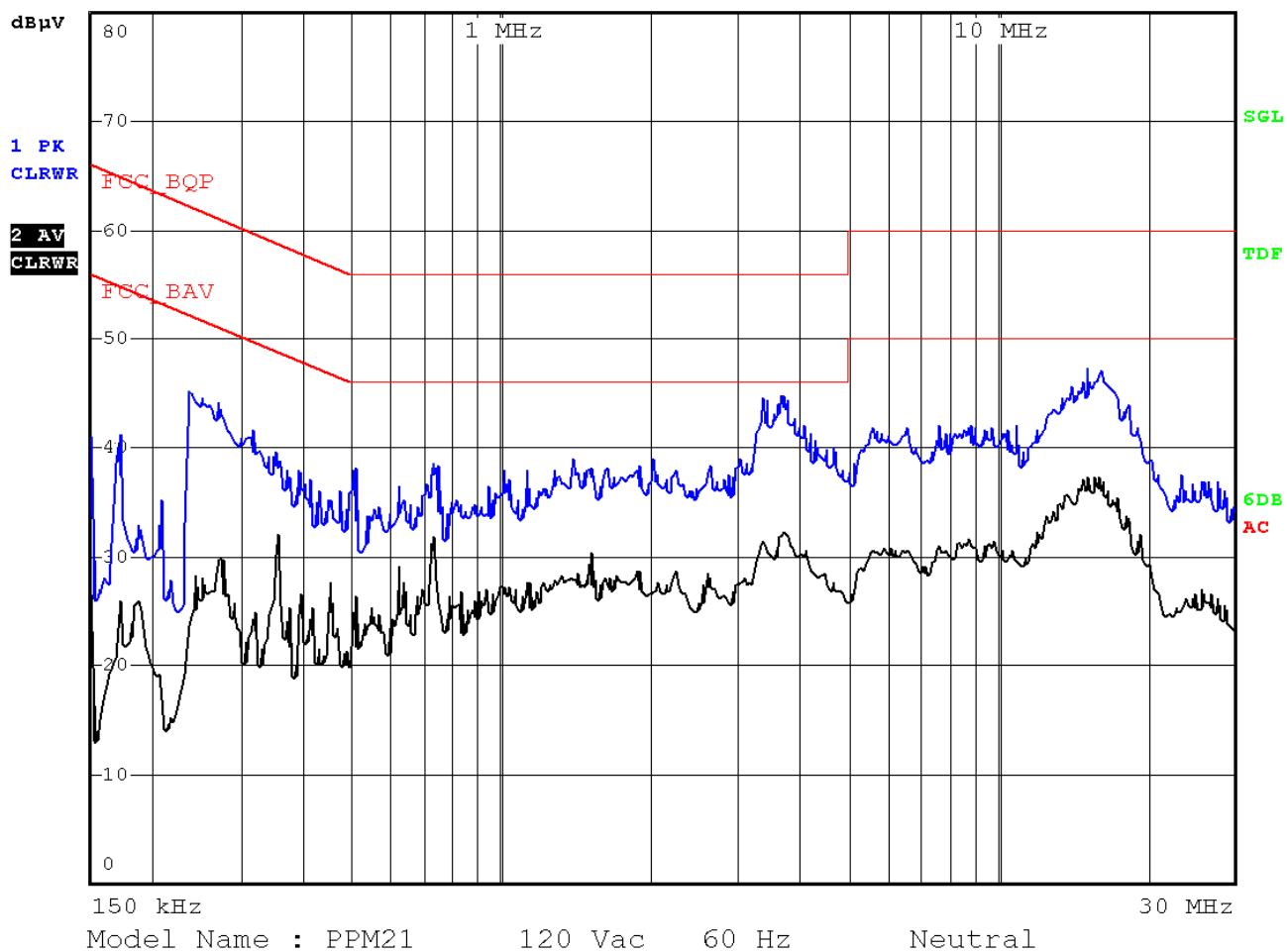
**Neutral**

RBW 9 kHz

MT 100 ms

PREAMP OFF

Att 10 dB



Freq. [MHz]	Measurement [dB $\mu$ N]		Limit [dB $\mu$ N]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB $\mu$ N]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.150	27.52	16.63	66.00	56.00	9.56	0.05	37.13	26.24	28.87	29.76
0.170	20.75	16.26	64.96	54.96	9.56	0.04	30.35	25.86	34.61	29.10
0.234	33.42	17.15	62.31	52.31	9.55	0.03	43.01	26.74	19.30	25.57
0.734	26.21	22.03	56.00	46.00	9.56	0.06	35.83	31.65	20.17	14.35
3.631	28.34	22.51	56.00	46.00	9.59	0.15	38.08	32.25	17.92	13.75
15.286	32.63	27.14	60.00	50.00	9.66	0.24	42.53	37.04	17.47	12.96

**Note** : Charging + File Up & Down + Play(Aux) mode.



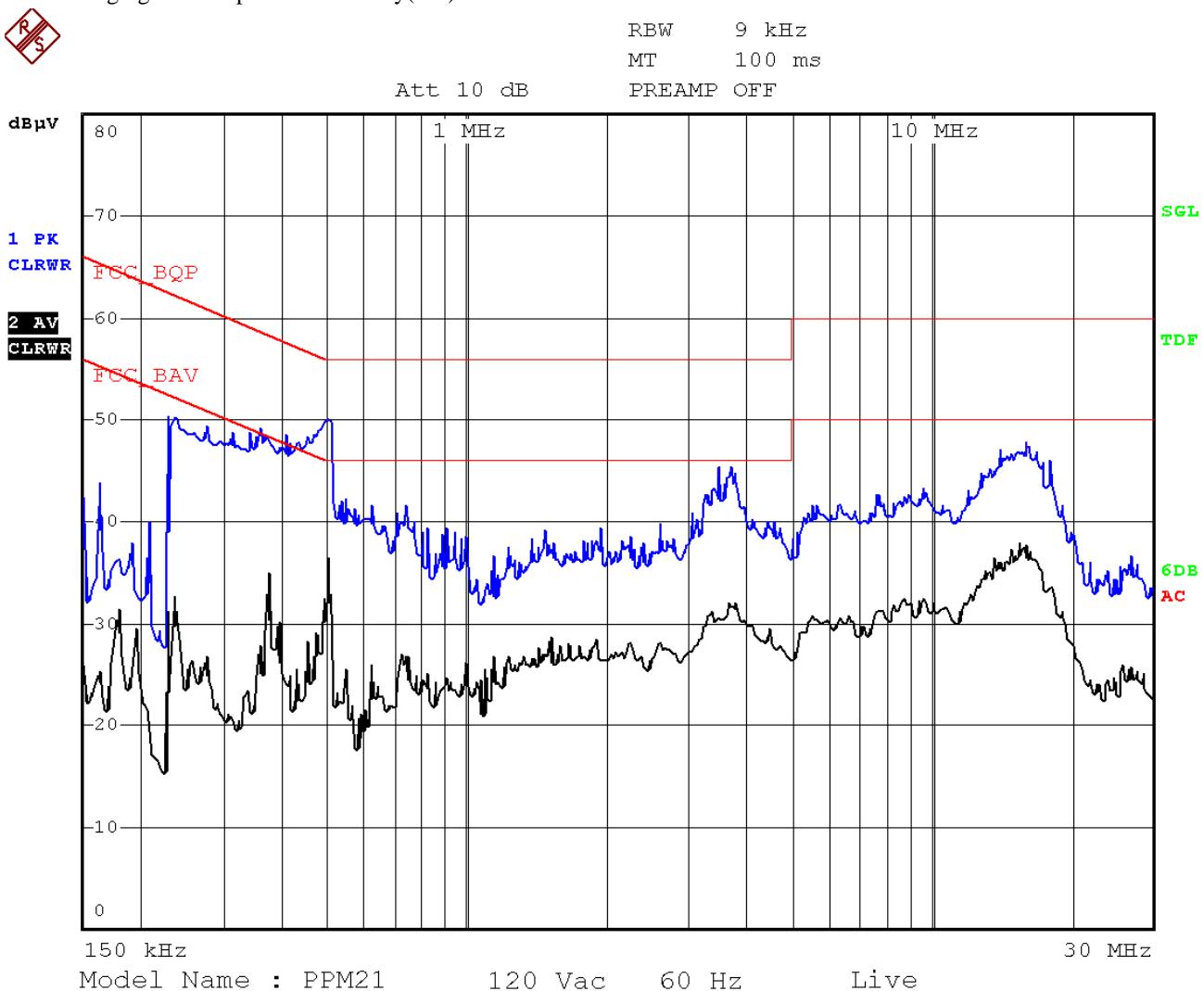
IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

Conducted Emissions

1. Charging + File Up &amp; Down + Play(Bal) mode

Live



Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.150	27.31	17.64	66.00	56.00	9.55	0.05	36.91	27.24	29.09	28.76
0.162	27.12	16.65	65.36	55.36	9.55	0.05	36.72	26.25	28.65	29.12
0.226	34.53	15.31	62.60	52.60	9.55	0.03	44.11	24.89	18.48	27.70
0.498	37.98	23.14	56.03	46.03	9.56	0.05	47.59	32.75	8.45	13.29
3.486	28.24	21.36	56.00	46.00	9.58	0.16	37.98	31.10	18.02	14.90
15.982	31.72	26.64	60.00	50.00	9.67	0.25	41.64	36.56	18.36	13.44

Note : Charging + File Up &amp; Down + Play(Bal) mode.



IST Co., Ltd.  
TEST REPORT NO. : 14-IST-0284

## Conducted Emissions

## 1. Charging + File Up & Down + Play(Bal)

Neutral

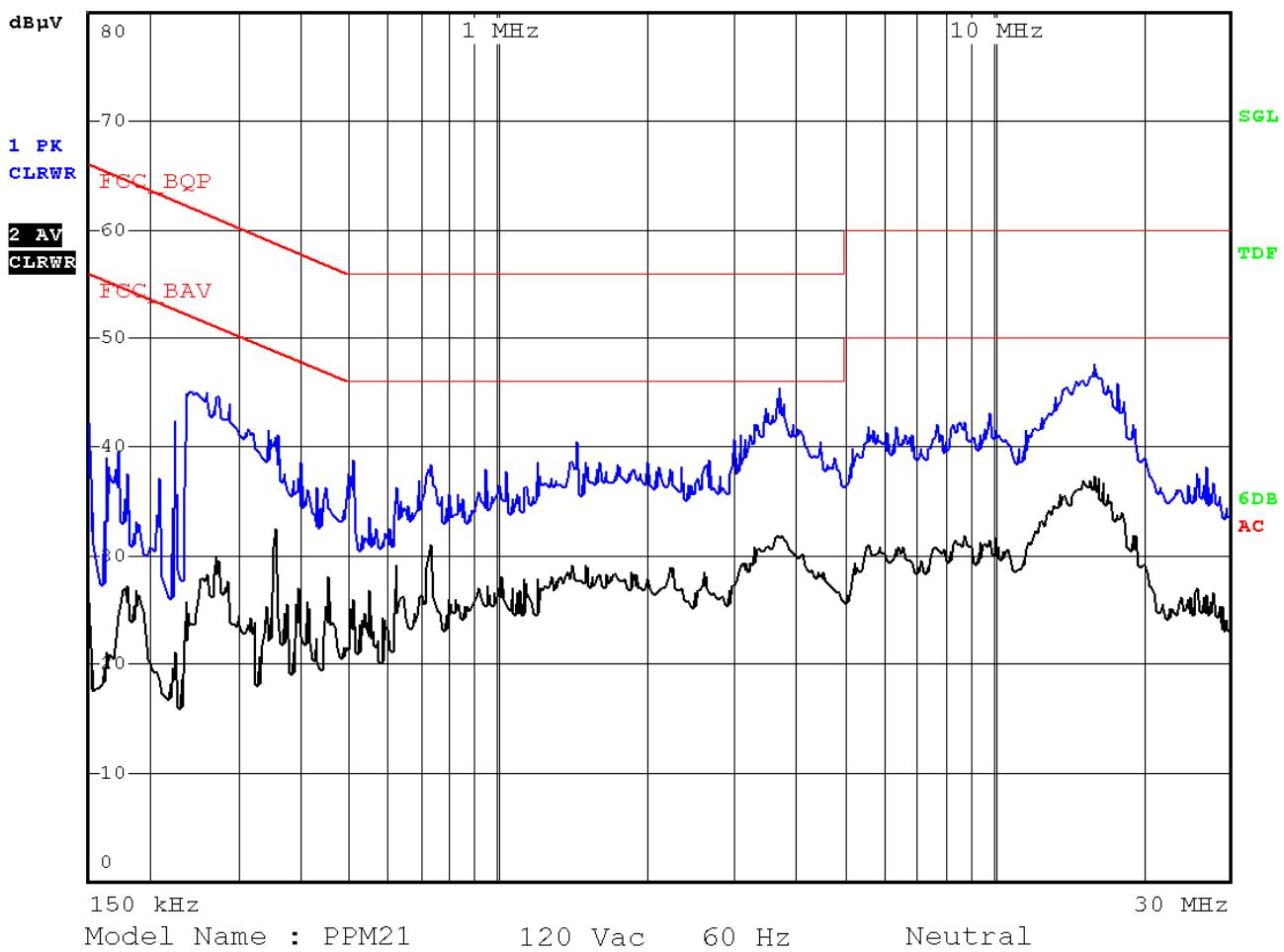
15

Att 10 dB

RBW 9 kHz

MT 100 ms

PREAMP OFF



Freq. [MHz]	Measurement [dB $\mu$ N]		Limit [dB $\mu$ N]		Insertion Loss	Cable Loss	Result [dB $\mu$ N]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB]	Q-peak	Average	Q-peak	Average
0.150	27.72	17.21	66.00	56.00	9.56	0.05	37.33	26.82	28.67	29.18
0.170	20.95	16.13	64.96	54.96	9.56	0.04	30.55	25.73	34.41	29.23
0.222	31.93	14.45	62.74	52.74	9.56	0.03	41.52	24.04	21.23	28.71
0.238	33.25	16.43	62.17	52.17	9.55	0.03	42.84	26.02	19.33	26.15
3.718	28.12	21.72	56.00	46.00	9.59	0.15	37.85	31.45	18.15	14.55
16.014	32.64	27.54	60.00	50.00	9.66	0.25	42.55	37.45	17.45	12.55

**Note :** Charging + File Up & Down + Play(Bal) mode.



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

## TEST CONDITIONS AND DATA

### Radiated Emission

[Applicable]

◆ Test Equipment Used

Model Name	Description	Manufacture	Due for Cal	Serial No.
ESCS30	Test Receiver	Rohde & Schwarz	May 08, 2015	100171
VULB 9160	Antenna	Schwarzbeck	Jun. 03, 2015	3071
ESCI7	Test Receiver	Rohde & Schwarz	Jul. 16, 2014	100872
SPECTRUM ANALYZER	R3273	ADVANTEST	May. 08, 2015	110600587
8449B OPT H02	Pre Amplifier	HP	Oct. 08, 2014	3008A0530
3115	Horn Ant.	EMCO	Dec. 04, 2015	9012-3602
HF906	Horn Ant.	Rohde & Schwarz	Oct. 25, 2015	100530

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Environmental Conditions

Temperature (19.7 ± 1.0) °C

Humidity (45.6 ± 0.2) % R.H.

Atmosphere pressure 1005 mbar

◆ Test Program See the operational condition page 8.

◆ Test Area Open Site #2, Full-Anechoic Room (3 m)

◆ Test Date May 07, 2014

Note :



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

**Radiated Emissions****Below 1GHz**

[Applicable]

1. Charging + File Up &amp; Down + Play(Aux) mode

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/ m]	Margin [dB]
36.792	19.90	11.33	0.99	V	40.00	32.22	-7.78
150.285	19.10	12.60	2.02	H	43.50	33.72	-9.78
299.663	22.40	12.92	2.92	H	46.00	38.24	-7.76
431.564	19.30	16.27	3.47	V	46.00	39.04	-6.96
553.436	17.20	18.90	4.01	V	46.00	40.11	-5.89
889.401	12.30	22.88	5.07	V	46.00	40.25	-5.75

1. Charging + File Up &amp; Down + Play(Bal) mode

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/ m]	Margin [dB]
36.794	19.40	11.33	0.99	V	40.00	31.72	-8.28
150.286	19.10	12.60	2.02	V	43.50	33.72	-9.78
250.193	20.50	11.18	2.70	H	46.00	34.38	-11.62
323.912	20.30	13.53	3.03	H	46.00	36.86	-9.14
369.504	19.30	14.67	3.22	H	46.00	37.19	-8.81
431.581	19.50	16.27	3.47	H	46.00	39.24	-6.76
892.317	13.20	22.90	5.08	V	46.00	41.18	-4.82

**Note : Limits Below 1 GHz (3 m method)**



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

2. Only Play(Aux) mode

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/ m]	Margin [dB]
36.791	21.30	11.33	0.99	V	40.00	33.62	-6.38
68.803	22.40	9.70	1.36	V	40.00	33.46	-6.54
93.054	21.70	7.84	1.57	V	43.50	31.11	-12.39
216.247	18.20	9.78	2.53	H	46.00	30.51	-15.49
264.745	17.60	11.69	2.76	H	46.00	32.05	-13.95
312.274	17.20	13.24	2.98	H	46.00	33.42	-12.58
894.258	12.80	22.92	5.09	H	46.00	40.81	-5.19

2. Only Play(Bal) mode

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/ m]	Margin [dB]
36.796	22.00	11.33	0.99	V	40.00	34.32	-5.68
77.534	22.10	8.60	1.46	H	40.00	32.16	-7.84
145.437	20.80	12.47	1.99	V	43.50	35.26	-8.24
216.245	18.50	9.78	2.53	H	46.00	30.81	-15.19
312.273	17.40	13.24	2.98	H	46.00	33.62	-12.38
894.258	12.30	22.92	5.09	V	46.00	40.31	-5.69

**Note : Limits Below 1 GHz (3 m method)**



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

Radiated EmissionsAbove 1GHz

## 1. Charging + File Up &amp; Down + Play(Aux) mod

Horizontal

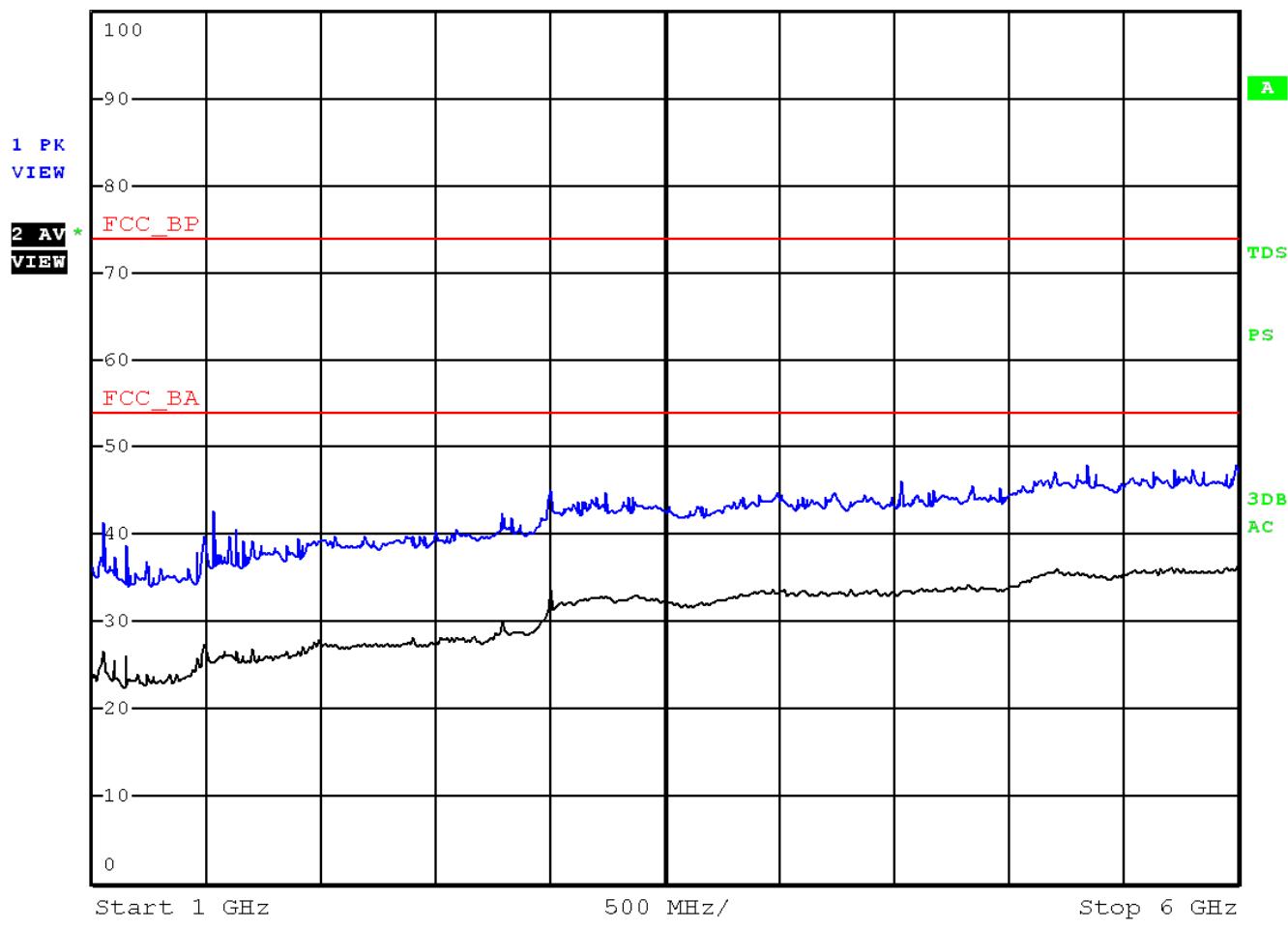
Ref 100 dB $\mu$ V/m

\* Att 10 dB

\* RBW 1 MHz

\* VBW 3 MHz

\* SWT 70 ms



Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average		Peak	Average	Peak	Average
1.053	41.26	26.62	100	74.00	54.00	32.74	27.38
1.153	38.64	26.23	100	74.00	54.00	35.36	27.77
1.535	42.53	25.35	100	74.00	54.00	31.47	28.65
2.791	42.21	29.95	100	74.00	54.00	31.79	24.05
3.002	45.12	33.68	100	74.00	54.00	28.88	20.32
5.206	47.17	35.79	100	74.00	54.00	26.83	18.21

Note : Reading measurement is included Loss factors.



IST Co., Ltd.

TEST REPORT NO. : 14-JST-0284

## Radiated Emissions

**Above 1GHz**

## 1. Charging + File Up & Down + Play(Aux) mode

## Vertical

RS

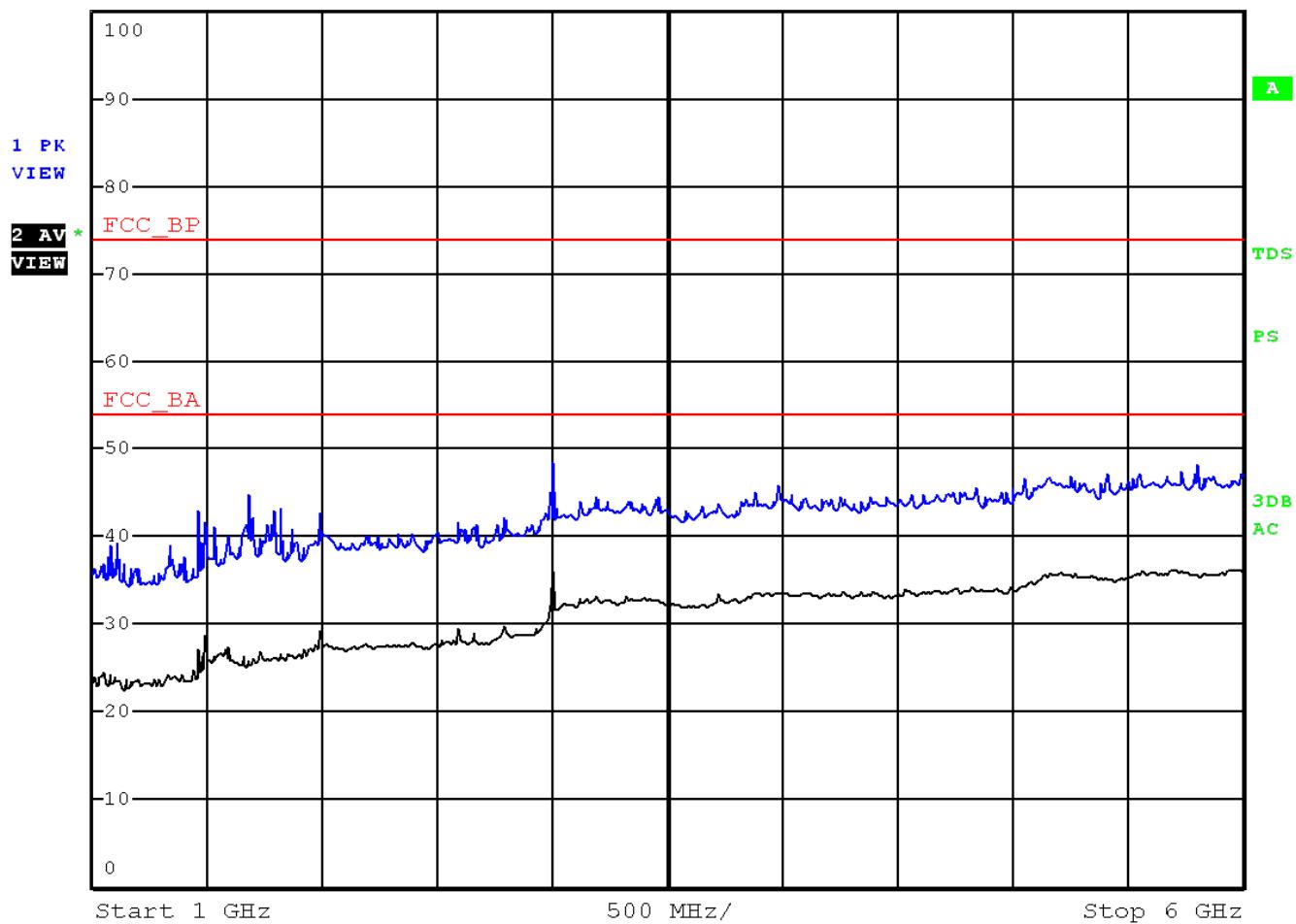
Ref 100 dB $\mu$ V/m

\* Att 10 dB

\* RBW 1 MHz

\* VBW 3 MHz

\* SWT 70 ms



Model Name : PPM21		120 Vac		60 Hz		Vertical	
Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average		Peak	Average	Peak	Average
1.112	39.36	23.44	100	74.00	54.00	34.64	30.56
1.466	42.97	27.06	100	74.00	54.00	31.03	26.94
1.681	44.77	25.86	100	74.00	54.00	29.23	28.14
1.992	42.68	29.20	100	74.00	54.00	31.32	24.80
3.004	48.52	36.10	100	74.00	54.00	25.48	17.90
5.803	48.12	35.52	100	74.00	54.00	25.88	18.48

*Note : Reading measurement is included Loss factors.*



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

Radiated EmissionsAbove 1GHz

## 1. Charging + File Up &amp; Down Play(Bal) mode

Horizontal

Ref 100 dB $\mu$ V/m

\* Att 10 dB

\* RBW 1 MHz

\* VBW 3 MHz

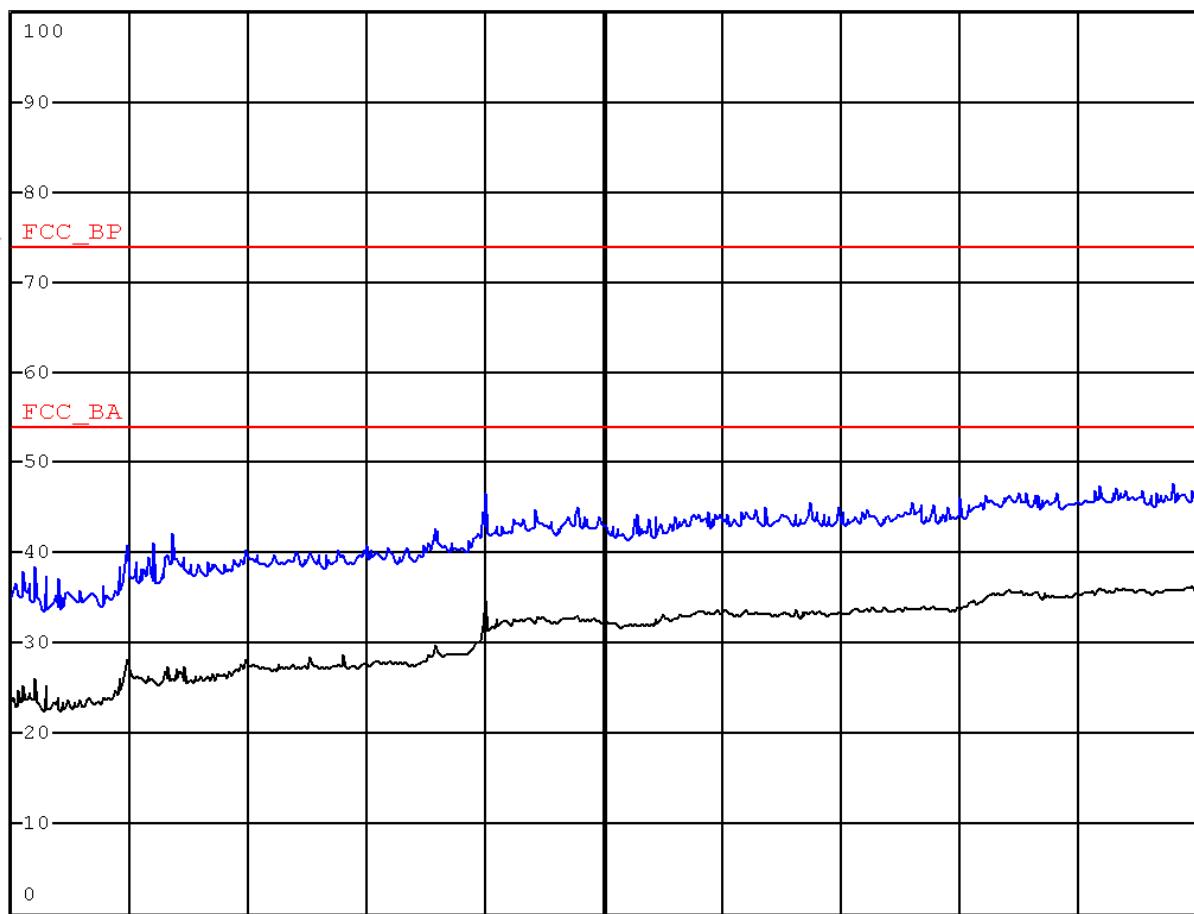
\* SWT 70 ms

1 PK  
VIEW2 AV \*  
VIEW

A

TDS

PS

3DB  
AC

Start 1 GHz

500 MHz/

Stop 6 GHz

Model Name : PPM21

120 Vac 60 Hz

Horizontal

Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average		Peak	Average	Peak	Average
1.103	38.36	26.01	100	74.00	54.00	35.64	27.99
1.495	40.89	28.23	100	74.00	54.00	33.11	25.77
1.684	42.07	26.30	100	74.00	54.00	31.93	27.70
2.792	42.73	29.82	100	74.00	54.00	31.27	24.18
3.001	46.62	34.65	100	74.00	54.00	27.38	19.35
5.902	47.62	35.87	100	74.00	54.00	26.38	18.13

Note : Reading measurement is included Loss factors.



Radiated Emissions

Above 1GHz

1. Charging + File Up & Down + Play(Bal) mode

Vertical



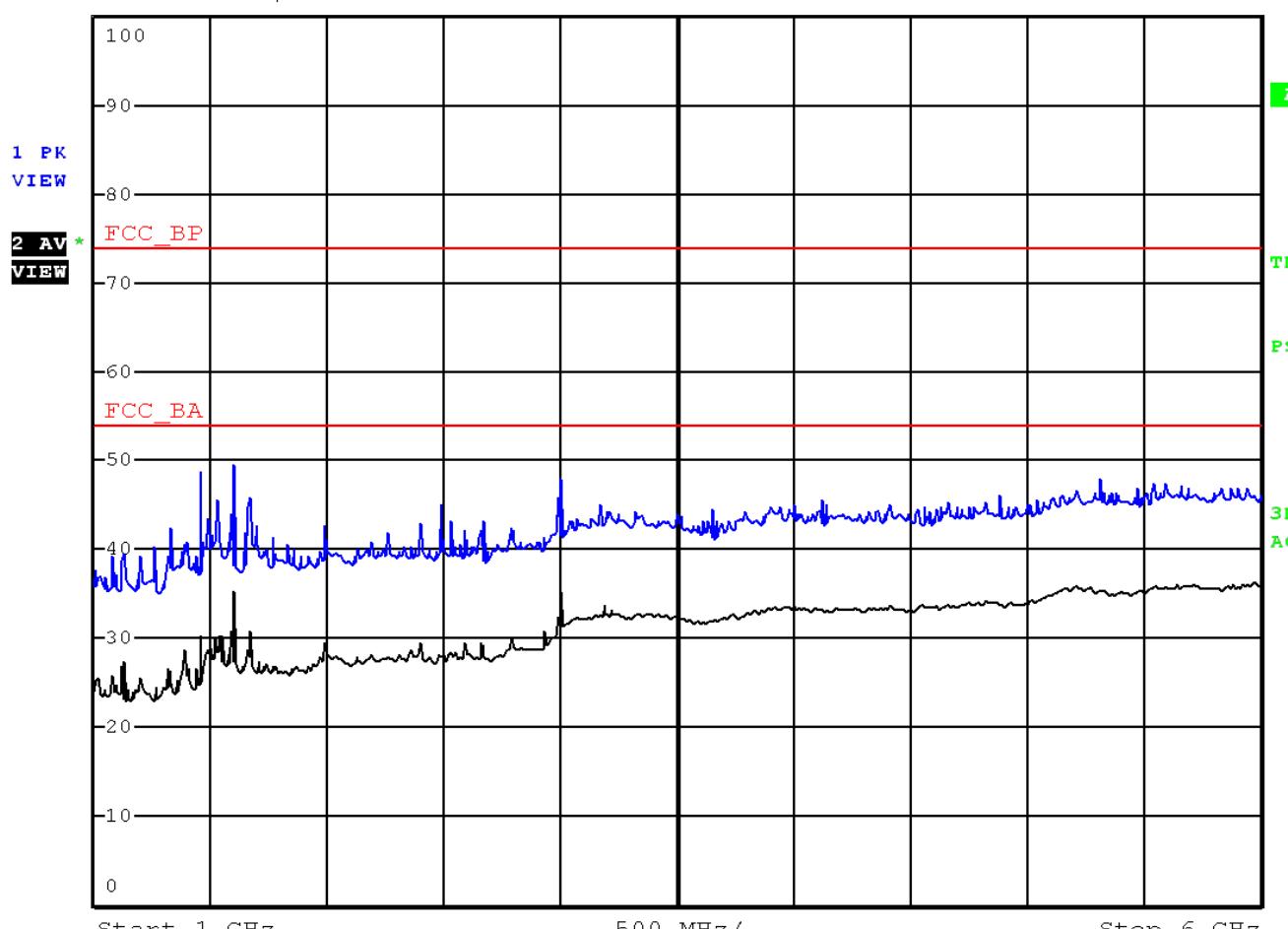
Ref 100 dB $\mu$ V/m

\* Att 10 dB

\* RBW 1 MHz

\* VBW 3 MHz

\* SWT 70 ms



Start 1 GHz 500 MHz/ Stop 6 GHz  
Model Name : PPM21 120 Vac 60 Hz Vertical

Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average		Peak	Average	Peak	Average
1.130	39.46	27.49	100	74.00	54.00	34.54	26.51
1.462	48.58	30.19	100	74.00	54.00	25.42	23.81
1.604	49.44	35.30	100	74.00	54.00	24.56	18.70
2.493	44.98	27.94	100	74.00	54.00	29.02	26.06
3.001	48.02	35.22	100	74.00	54.00	25.98	18.78
5.312	47.85	35.29	100	74.00	54.00	26.15	18.71

Note : Reading measurement is included Loss factors.



Radiated Emissions

Above 1GHz

2. Only Play(Aux) mode

Horizontal



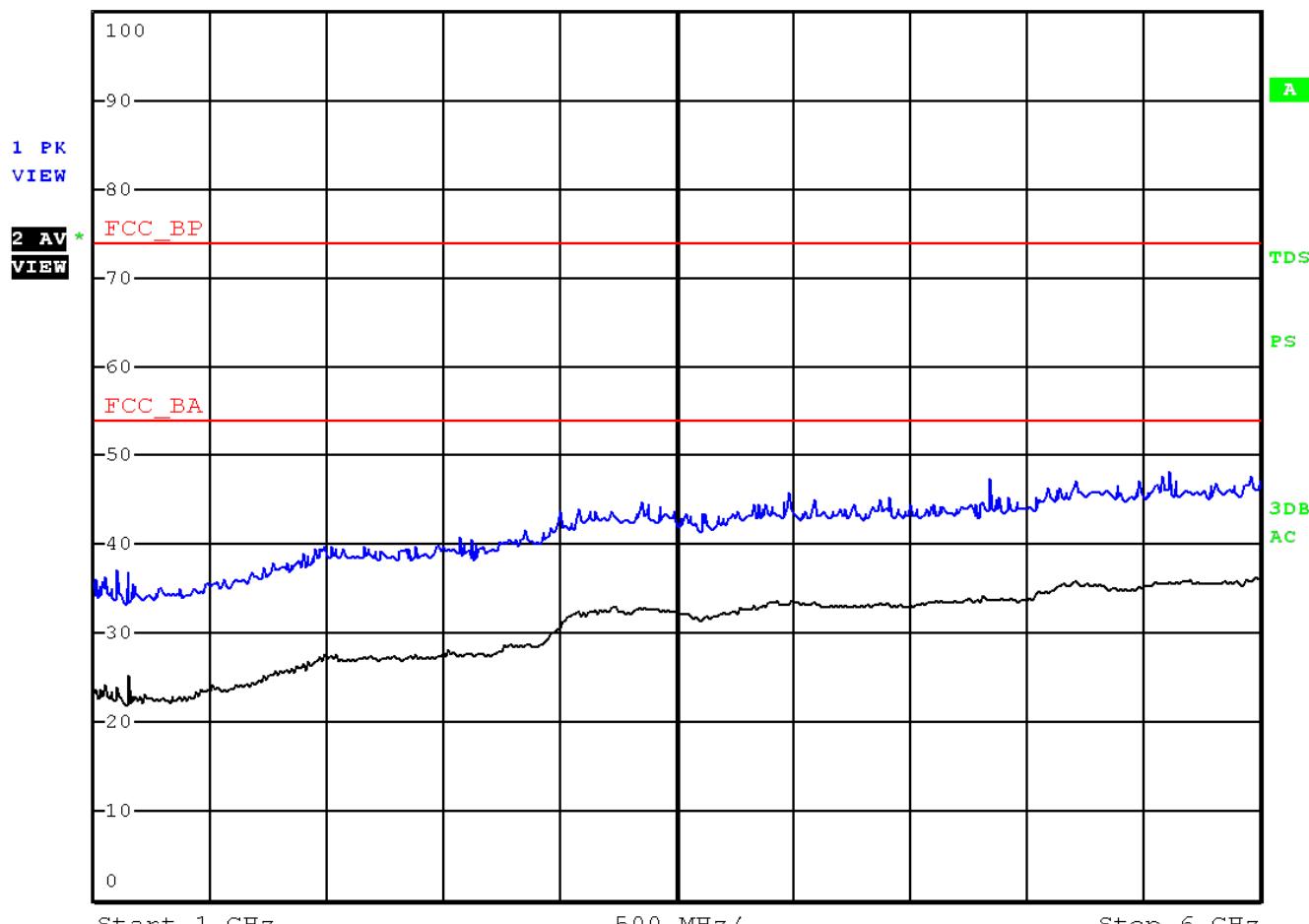
Ref 100 dB $\mu$ V/m

\* Att 10 dB

\* RBW 1 MHz

\* VBW 3 MHz

\* SWT 70 ms



Start 1 GHz

500 MHz/

Stop 6 GHz

Model Name : PPM21

120 Vac 60 Hz

Horizontal

Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average		Peak	Average	Peak	Average
1.152	36.85	25.20	100	74.00	54.00	37.15	28.80
1.995	39.79	27.74	100	74.00	54.00	34.21	26.26
3.351	44.78	32.60	100	74.00	54.00	29.22	21.40
3.983	45.73	33.33	100	74.00	54.00	28.27	20.67
4.842	47.46	33.69	100	74.00	54.00	26.54	20.31
5.616	48.09	35.71	100	74.00	54.00	25.91	18.29

Note : Reading measurement is included Loss factors.



Radiated Emissions

Above 1GHz

2. Only Play(Aux) mode

Vertical



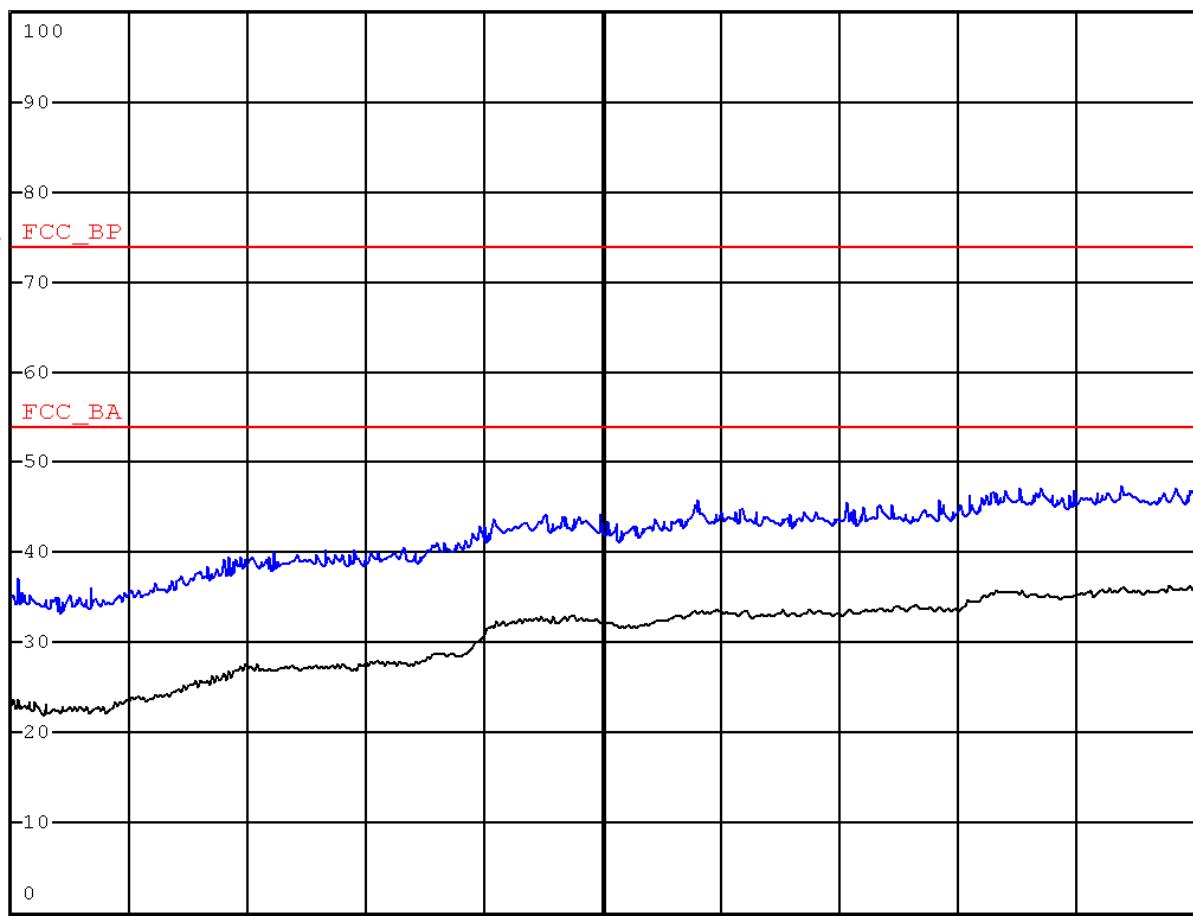
Ref 100 dB $\mu$ V/m

\* Att 10 dB

\* RBW 1 MHz

\* VBW 3 MHz

\* SWT 70 ms



Start 1 GHz

500 MHz/

Stop 6 GHz

Model Name : PPM21

120 Vac 60 Hz

Vertical

Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average		Peak	Average	Peak	Average
1.031	37.13	23.73	100	74.00	54.00	36.87	30.27
2.025	39.57	27.40	100	74.00	54.00	34.43	26.60
3.043	43.69	31.72	100	74.00	54.00	30.31	22.28
3.902	45.85	33.13	100	74.00	54.00	28.15	20.87
5.261	47.20	35.23	100	74.00	54.00	26.80	18.77
5.693	47.38	36.14	100	74.00	54.00	26.62	17.86

Note : Reading measurement is included Loss factors.



IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

Radiated EmissionsAbove 1GHz

## 2. Only Play(Bal) mode

Horizontal

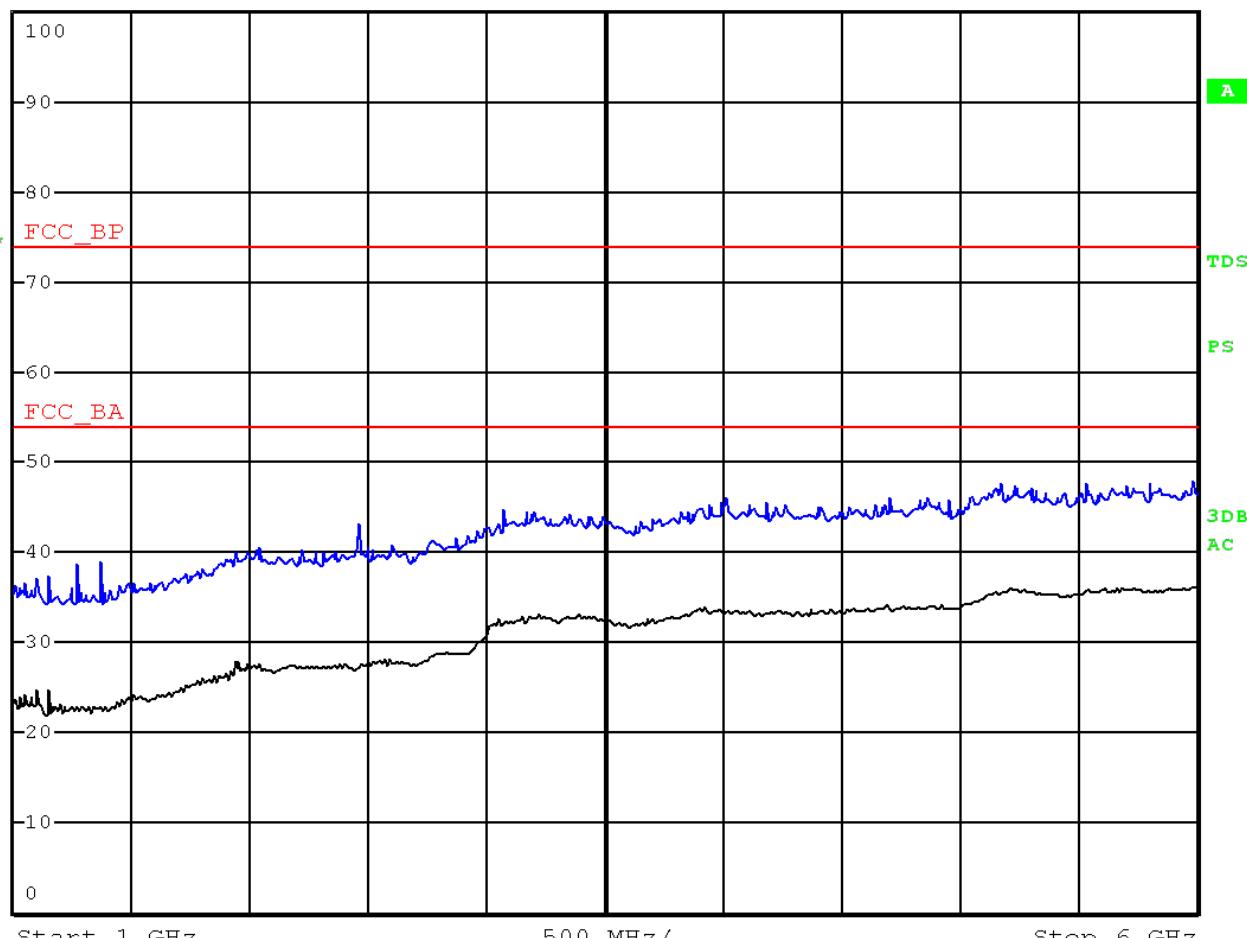
Ref 100 dB $\mu$ V/m

\* Att 10 dB

\* RBW 1 MHz

\* VBW 3 MHz

\* SWT 70 ms



Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average		Peak	Average	Peak	Average
1.042	39.31	22.91	100	74.00	54.00	34.69	31.09
1.203	42.99	23.16	100	74.00	54.00	31.01	30.84
1.731	41.32	26.05	100	74.00	54.00	32.68	27.95
3.375	45.10	32.91	100	74.00	54.00	28.90	21.09
5.283	47.95	35.53	100	74.00	54.00	26.05	18.47
5.731	48.19	36.09	100	74.00	54.00	25.81	17.91

Note : Reading measurement is included Loss factors.



Radiated Emissions

Above 1GHz

2. Only Play(Bal) mode

Vertical



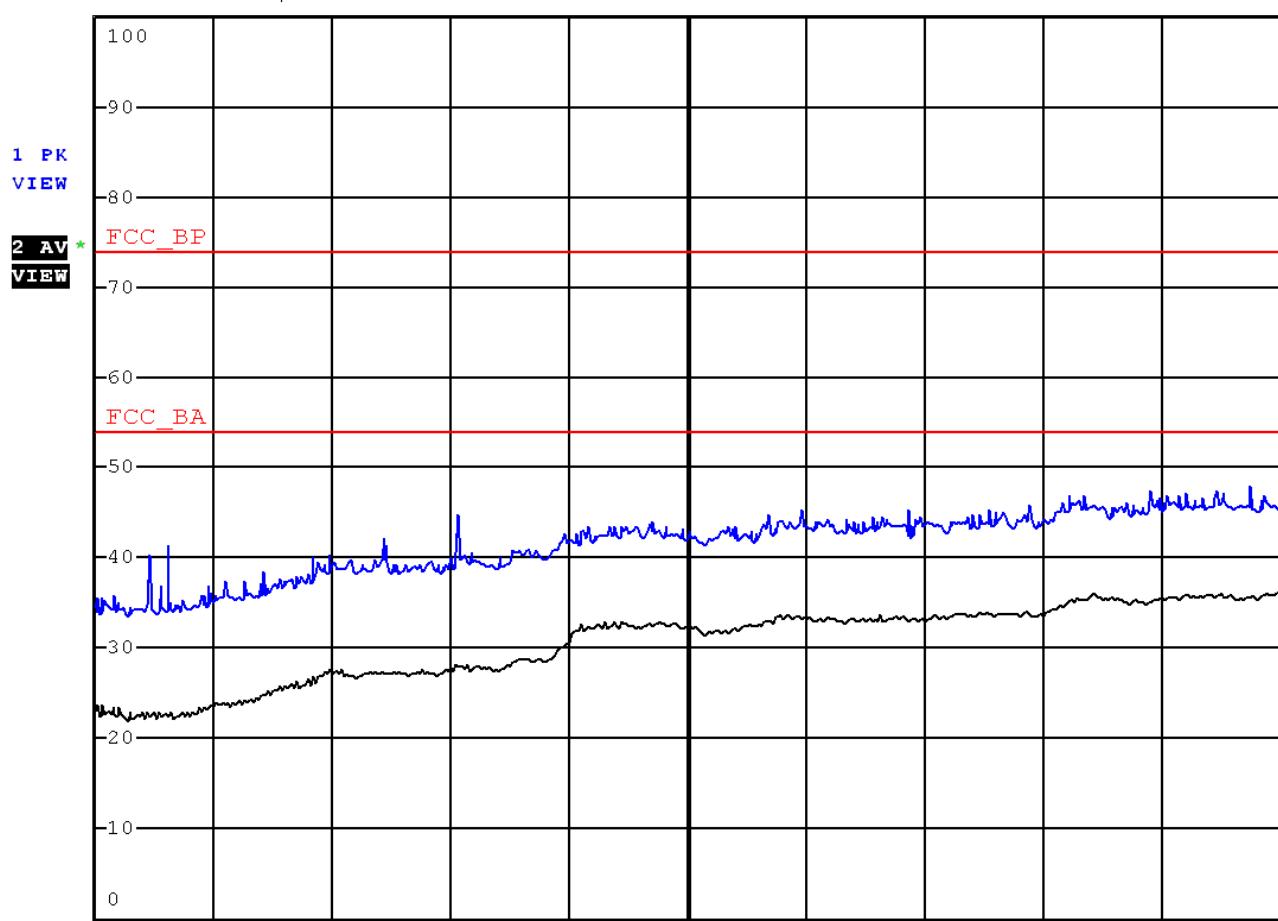
Ref 100 dB $\mu$ V/m

\* Att 10 dB

\* RBW 1 MHz

\* VBW 3 MHz

\* SWT 70 ms



Start 1 GHz

500 MHz/

Stop 6 GHz

Model Name : PPM21

120 Vac 60 Hz

Vertical

Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average		Peak	Average	Peak	Average
1.232	40.38	22.42	100	74.00	54.00	33.62	31.58
1.315	41.25	22.39	100	74.00	54.00	32.75	31.61
2.223	42.01	27.07	100	74.00	54.00	31.99	26.93
2.531	44.80	27.86	100	74.00	54.00	29.20	26.14
5.175	46.72	35.20	100	74.00	54.00	27.28	18.80
5.872	47.97	35.66	100	74.00	54.00	26.03	18.34

Note : Reading measurement is included Loss factors.



**Appendix A. Test Setup Photos**

1. Charging + File Up & Down + Play(Aux/Bal) mode

Conducted Emissions - Front View



Conducted Emissions - Rear View





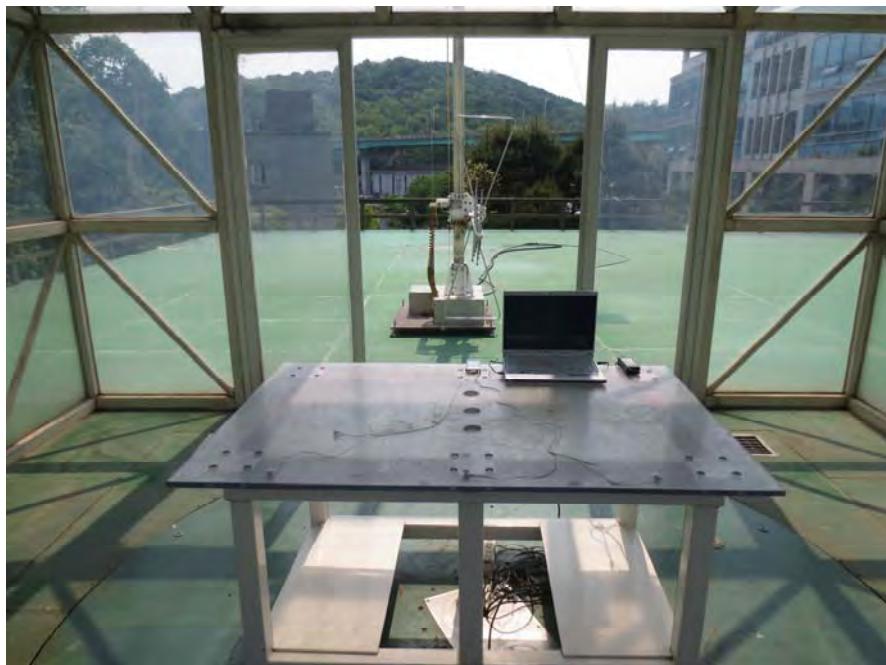
IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

**Appendix A. Test Setup Photos**

1. Charging + File Up & Down + Play(Aux/Bal) mode

**Radiated Emissions below 1 GHz - Front View**



**Radiated Emissions below 1 GHz - Rear View**





IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

2. Only Play(Aux/Bal) mode

Radiated Emissions below 1 GHz - Front View



Radiated Emissions below 1 GHz - Rear View





IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

**Appendix A. Test Setup Photos**

1. Charging + File Up & Down + Play(Aux/Bal) mode

Radiated Emissions Above 1 GHz - Front View



Radiated Emissions Above 1 GHz - Rear View





IST Co., Ltd.

TEST REPORT NO. : 14-IST-0284

2. Only Play(Aux/Bal) mode

Radiated Emissions Above 1 GHz - Front View



Radiated Emissions Above 1 GHz - Rear View

